

Environmental Educational Efforts In Support of USEPA

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Educational Efforts

- Onsite and Decentralized Wastewater Management
- Biosolids and Septage
- Animal Waste
- Wastewater Reuse
- Stormwater

History and Present Condition

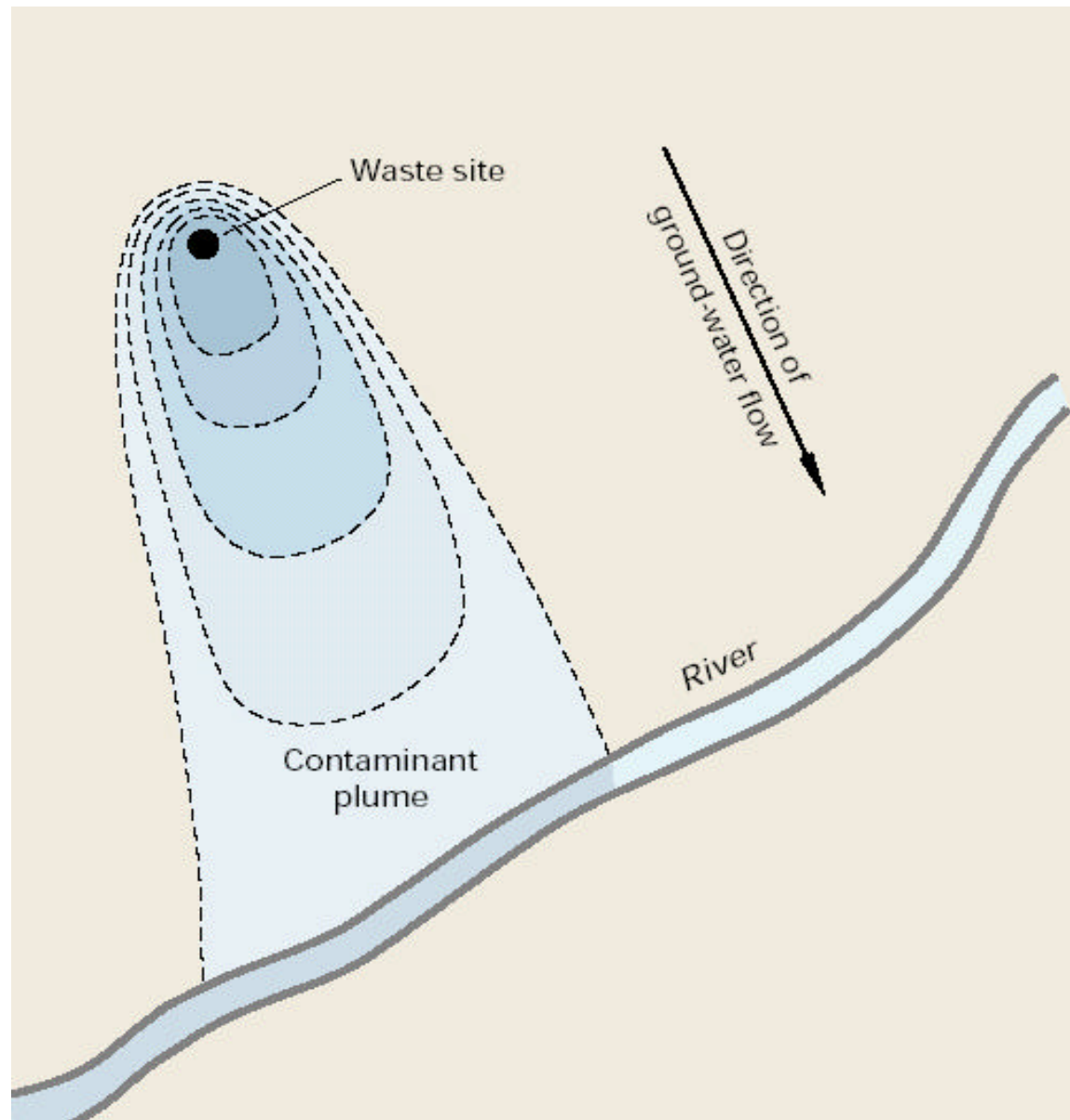
- Developments in Industry
 - History
 - Science Base Develops
- What We Have Learned
 - Options assessment
- Management Systems
- State and Federal Agency Commitment
- Your Input – Open Discussion

Traditional Options

- Community Collection and Treatment
 - Often Involves NPDES and stream discharge
 - Costly to design, build, own and operate
 - Permit limits ever change
 - Compliance issues
- Onsite/Decentralized
 - Often involve soil as final receiver
 - Moderate cost – often with no collection
 - Permit Requirements for Prescriptive Systems
 - Free drainage
 - No water on soil
 - Future
 - Performance requirements

Plumes easily migrate toward “gaining” streams in sandy/gravelly soils, given the continuous loading conditions.

Dilution & treatment rates vary with soil saturation/depth, travel times/lengths, carbon availability, & plant uptake

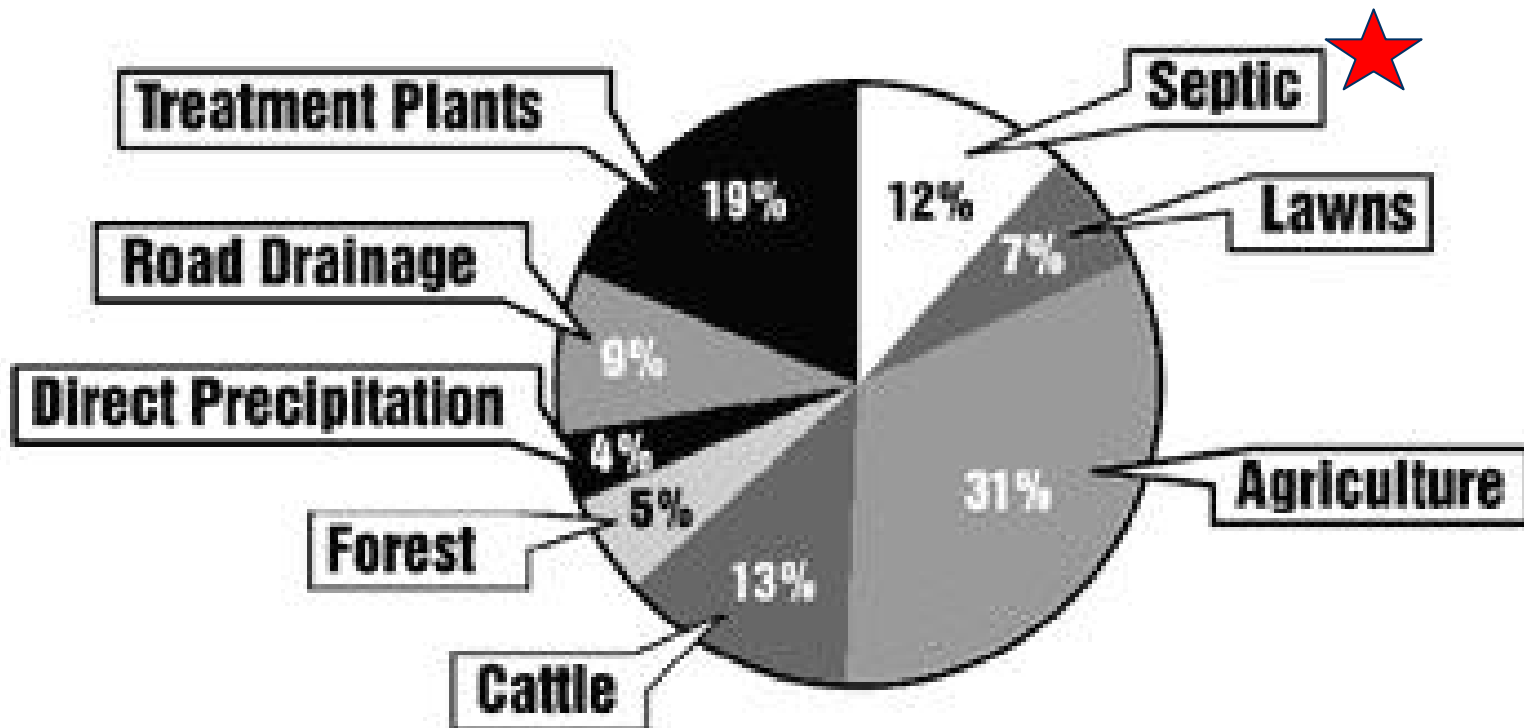


Source: USGS

Causes of impairment in U.S. surface waters (2000)

Cause Of Impairment	Count
Sediments	6,133
Pathogens	5,281
Nutrients	4,773
Metals	3,984
Dissolved Oxygen	3,772
Other Habitat Alterations	2,112
Temperature	1,884
pH	1,798
Impaired Biologic Community	1,440
Pesticides	1,432
Flow Alterations	1,099
Mercury	1,088
Organics	1,069
Noxious Aquatic Plants	831
Ammonia	752
Total	37,448

Septic system N contributions vary, but can be significant in coastal waters



Nitrogen loading analysis for Indian River Lagoon (FL)

Soil infiltration: some N removal

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Case study: septic tank effluent and soil water quality ^a

Parameter (units)	Statistics	Septic tank effluent quality	Soil water quality ^b at 0.6 meter	Soil water Quality ^b at 1.2 meters
BOD (mg/L)	Mean Range # samples	93.5 46–156 11	<1 <1 6	<1 <1 6
TOC (mg/L)	Mean Range # samples	47.4 31–68 11	7.8 3.7–17.0 34	8.0 3.1–25.0 33
TKN (mg/L)	Mean Range # samples	44.2 19–53 11	0.77 0.40–1.40 35	0.77 0.25–2.10 33
NO ₃ -N (mg/L)	Mean Range # samples	0.04 0.01–0.16 11	21.6 1.7–39.0 35	13.0 2.0–29.0 32
TP (mg/L)	Mean Range # samples	8.6 7.2–17.0 11	0.40 0.01–3.8 35	0.18 0.02–1.80 33

Wastewater Volume and Quality

Source	N	Q (design)	Q (measured)	BOD/COD
Home		Typ	Typ	200/400
E. School	7	10	8	220/570
H.S.	4	25	19	250/690
Restaurant	3	40	38	430/900
F ² Restaurant	5	40	65	1320/3210
Rest Home	3	100	120	280/540
Vet Clinic	1		4500	650/1320
80 Mfg (WC)	1	25	12	420/900
Shp. Ctr. (fd)	1	5	3	5620

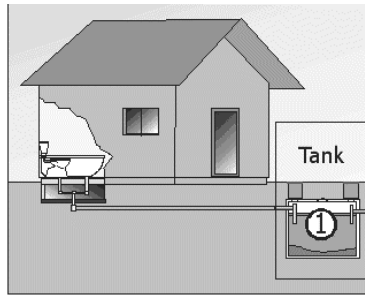
Treatment Systems/Dispersal Systems

- **Treatment** – Component of System that Facilitates Physical, Chemical, Biological Processes that Render Liquid Suitable for Dispersal into Receiver Environment
- **Dispersal** – Component of System that Facilitates the Uniform Distribution of Liquid into Receiver Environment

Adequate System Design

- Assures proper assimilation of all waste constituents into receiver environment
 - Fits the receiver environment
 - Fits the users ability to operate, maintain and manage the system
 - Utilizes appropriate technology and management
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Performance of Onsite Treatment Technologies



WASTEWATER FROM HOME

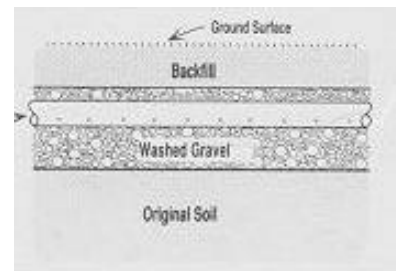
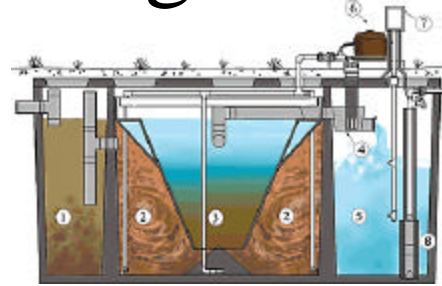
BOD: 110 - 400 mg/L
 TSS: 100 - 350 mg/L
 TN: 40 - 100 mg/L
 TP: 5 - 15 mg/L
 Fecal: $10^6 - 10^9$ col/100 ML

SEPTIC TANK EFFLUENT

BOD: 110 - 200 mg/L
 TSS: 50 - 100 mg/L
 TN: 40 - 100 mg/L
 TP: 5 - 15 mg/L
 Fecal: $10^6 - 10^8$ col/100 ML

SEPTIC TANK EFFLUENT, WITH RECYCLE

BOD: 80 - 120 mg/L
 TSS: 50 - 80 mg/L
 TN: 10 - 30 mg/L
 TP: 5 - 15 mg/L
 Fecal: $10^6 - 10^9$ col/100 ML



AEROBIC UNIT EFFLUENT

BOD: 5 - 50 mg/L
 TSS: 5 - 100 mg/L
 TN: 25 - 60 mg/L
 TP: 4 - 10 mg/L
 Fecal: $10^3 - 10^4$ col/100 ML

SAND FILTER EFFLUENT

BOD: 2 - 15 mg/L
 TSS: 5 - 20 mg/L
 TN: 10 - 50 mg/L
 TP: <1 - 10 mg/L
 Fecal: $10^1 - 10^3$ col/100 ML

FOAM/TEXTILE FILTER EFFLUENT

BOD: 5 - 15 mg/L
 TSS: 5 - 10 mg/L
 TN: 3 - 60 mg/L
 TP: 5 - 15 mg/L
 Fecal: $10^1 - 10^3$ col/100 ML

FURTHER ATTENUATION BY SOIL

BOD: >90%
 TSS: >90%
 TN: 10 TO 20%
 TP: 0 - 100%
 Fecal: >99.99%

Onsite/Decentralized Treatment Systems

- **Typical Treatment Components**

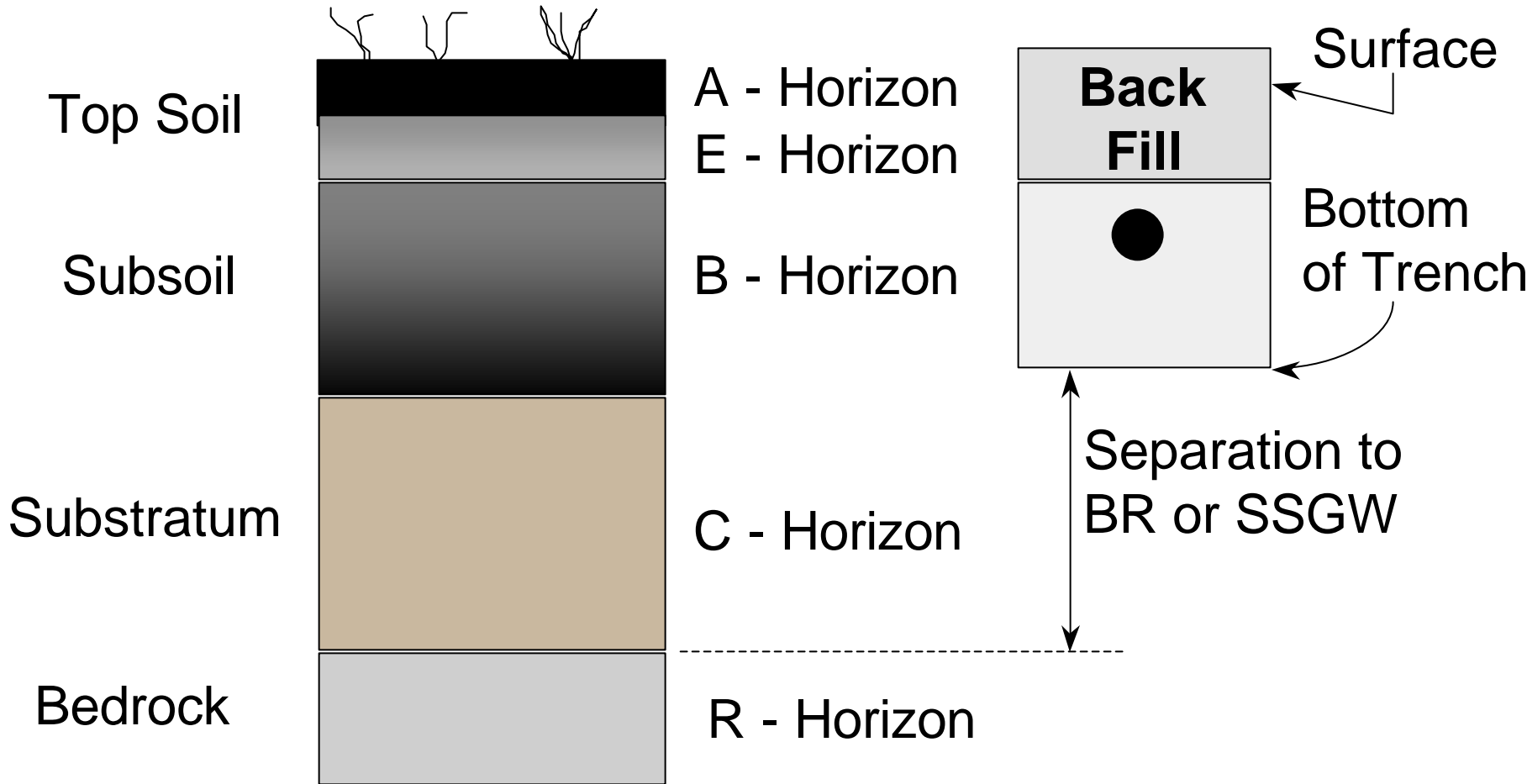
- Septic Tank (Baffle/Screen)
- Aeration Systems
 - ATU-Suspended Media
 - Fixed Media Filters
 - (sand/gravel/peat/foam)
- Constructed Wetland
- Disinfection
- Soils and Receiving Environment

- **Typical Dispersal Components**

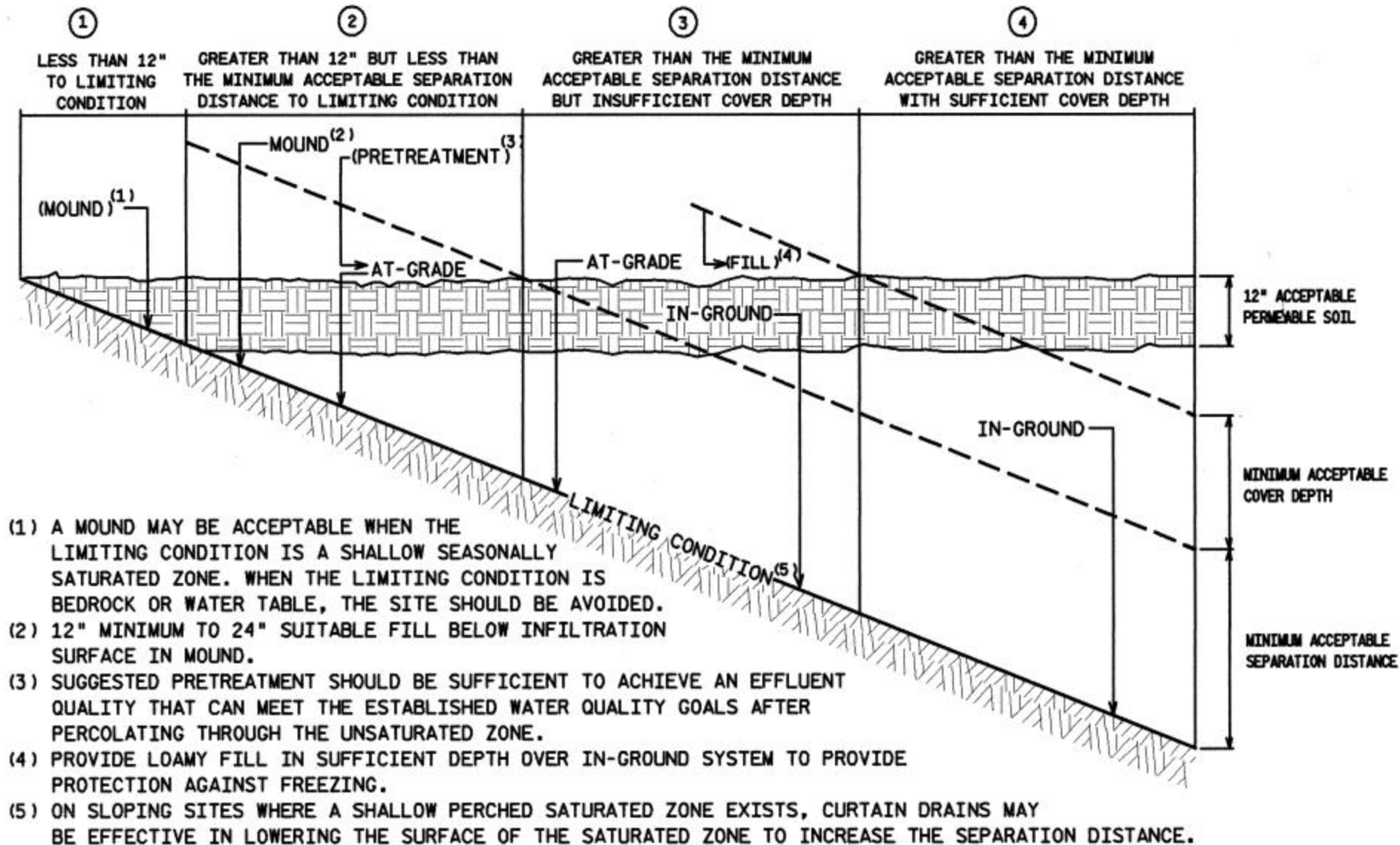
- Sub-Surface of Soil
- Soil Surface
- Permitted Point Discharge to Surface Waters



Soil Profile & Trench

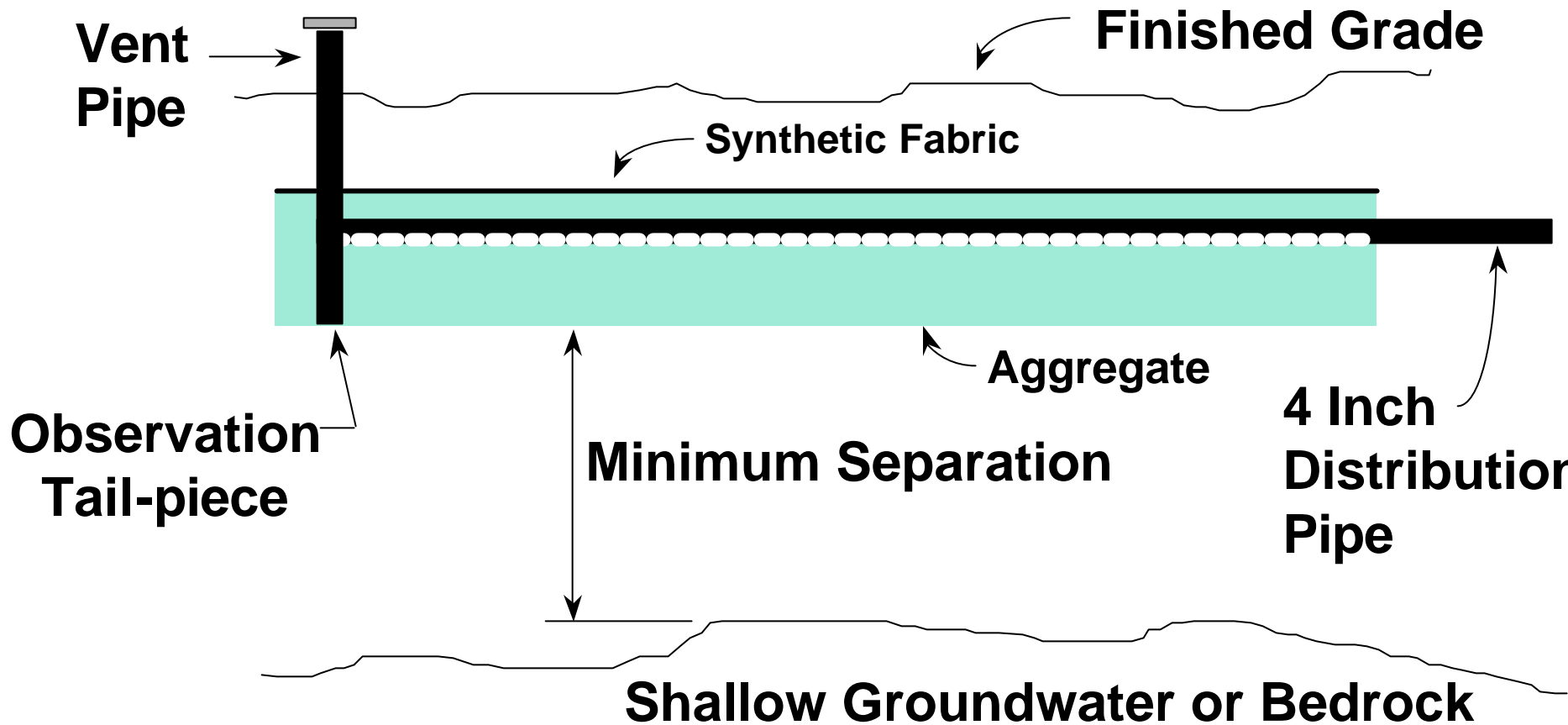


Vertical positioning issues

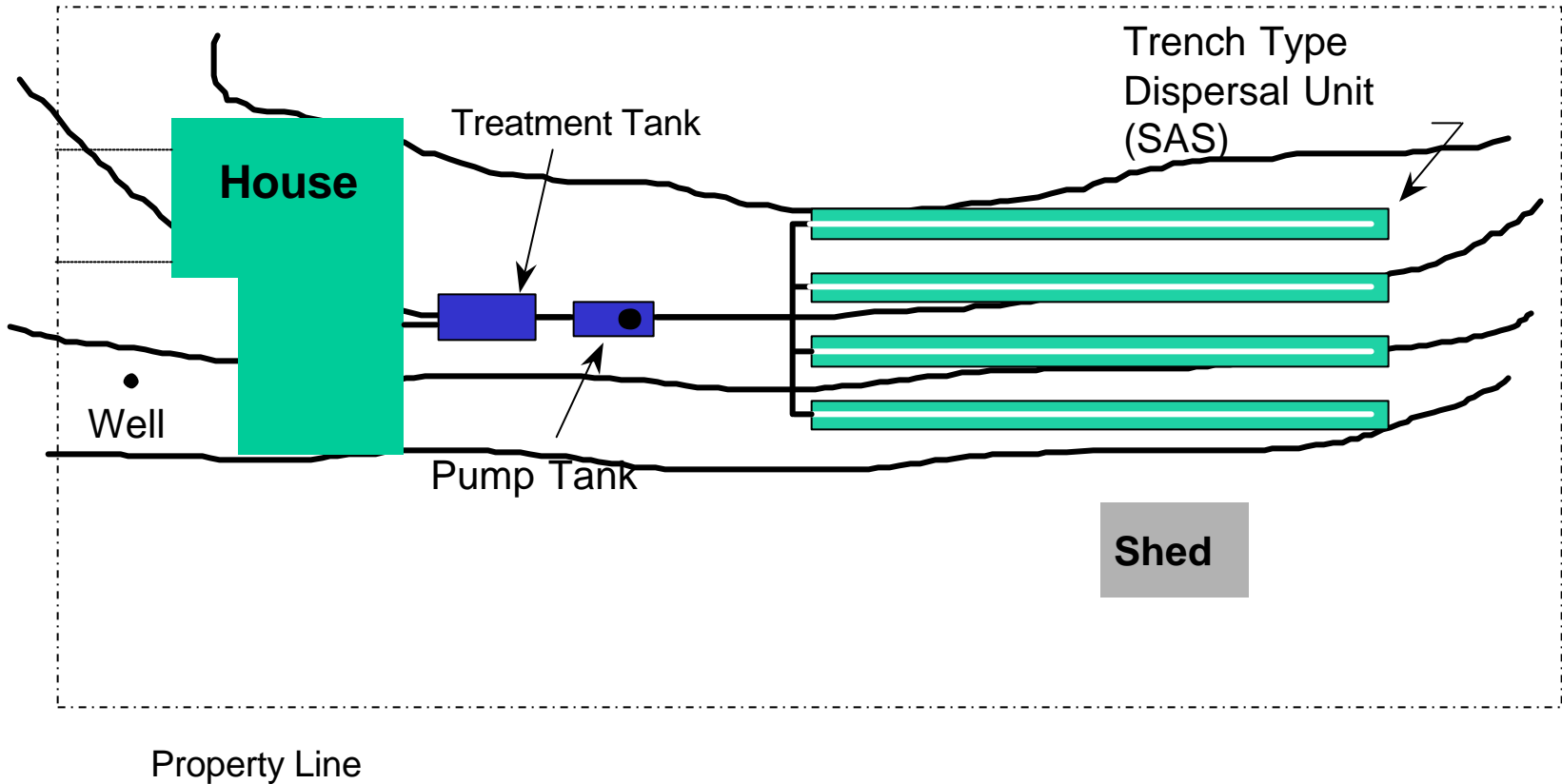


NOTE: MOUNDS OR AT-GRADES MAY BE APPROPRIATE UNDER CONDITIONS ③ AND ④ TO TAKE ADVANTAGE OF MORE PERMEABLE SURFACE SOIL HORIZONS.

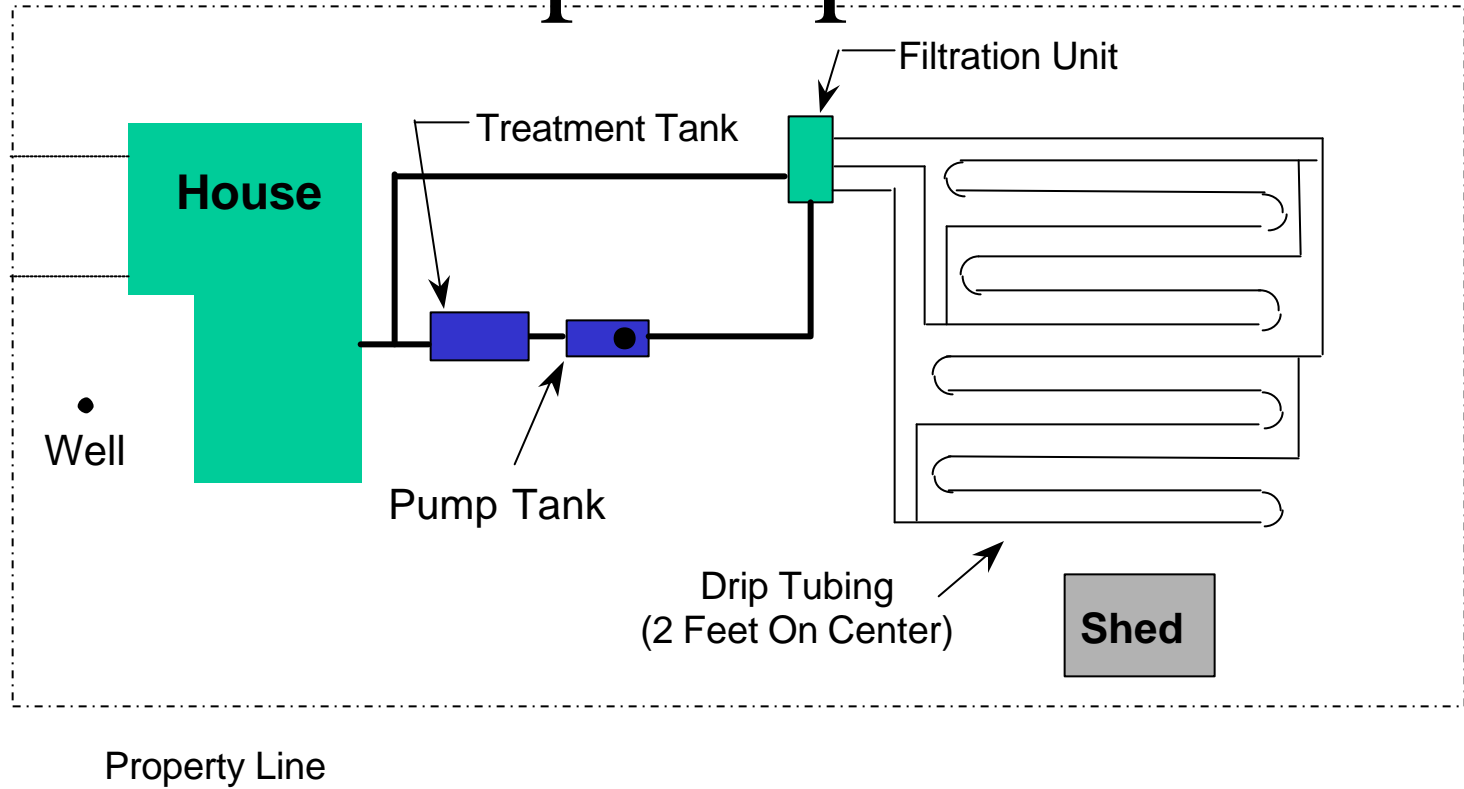
Gravity 4" Pipe System



Low Pressure Distribution



Drip Dispersal



Decentralized Approaches to Wastewater Management



**U.S. Environmental Protection Agency
Office of Wastewater Management**

Onsite Wastewater Treatment Systems Manual (2002)



- Background and Use of Onsite Wastewater Treatment Systems
- Management of Onsite Wastewater Treatment Systems
- Establishing Treatment System Performance Requirements
- Treatment Processes and Systems
- Treatment System Selection

Onsite Wastewater Systems

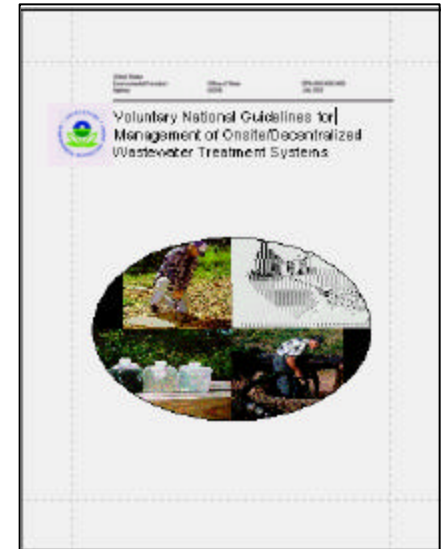
- The USEPA Recognizes Onsite and Decentralized Wastewater Systems as a Permanent and Essential Element of the Nations Wastewater Infrastructure
- The Agency Does NOT Support the Exclusion of Traditional Collection and Treatment Systems from Matrix of Available Options

Management Systems

- Individual system management
- Personnel management
- Organizational management
- Technical, managerial, financial capacity

EPA Onsite Guidelines

- Draft Published October, 2000
- Final Guidelines in 2 Months
 - Spring 2003
- Handbook
- Model Management Approaches:
 - Homeowner Awareness and Education
 - Maintenance Contracts
 - Renewable/Revocable Operating Permits
 - Responsible Management Entity (RME) Operation and Maintenance
 - RME Ownership and Management

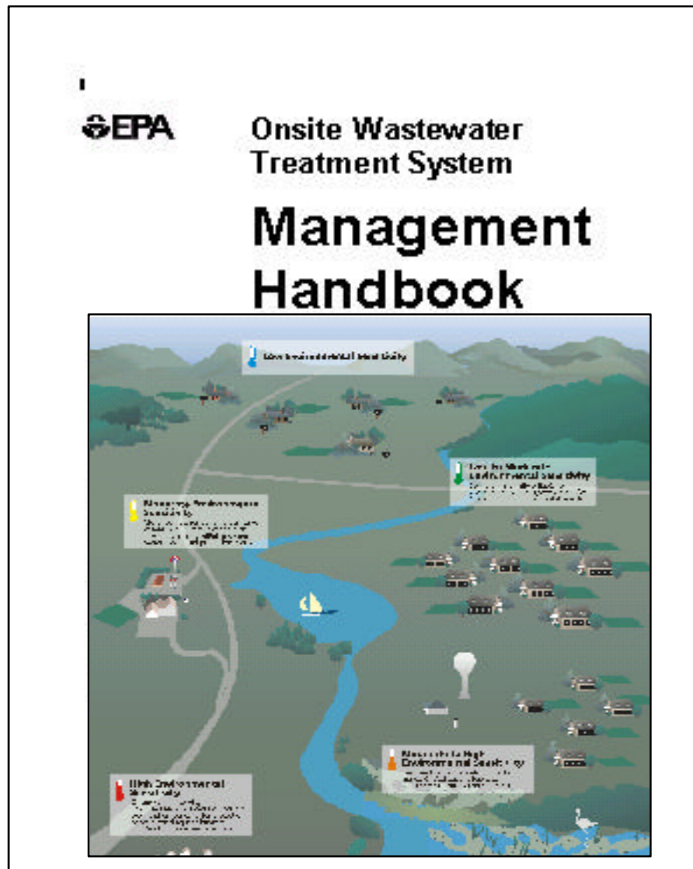


EPA Guidelines, Continued

- Objectives:
 - Raise the quality of management programs
 - Promote consistent approaches
 - Establish minimum levels of activity
 - Institutionalize concept of management
- Do not supercede existing laws
- Cover surface and subsurface discharges
- For existing, new, & all size systems



Management Handbook



- How to get started
- Program elements
- Assessing risk
- Case studies
- Resources

Management Promotes and Assures Protection Of:

- Public Health
- Environmental Quality
- Homeowner Investment
- Community Investment
- Tax Base

National Guidelines for Management

- ◆ 5 “Model Programs”
 - ◆ Cover new and existing systems
 - ◆ Surface and subsurface discharge
 - ◆ Do not supersede existing laws
-
-

Model Program	Management Objectives
1	<p>INVENTORY AND MAINTENANCE REMINDERS</p> <p>Appropriate for areas of low environmental sensitivity and sites are suitable for conventional onsite systems.</p>
2	<p>MAINTENANCE CONTRACTS</p> <p>Appropriate for areas of low to moderate environmental sensitivity where sites are marginally suitable for conventional onsite systems either due to small lots, shallow/low permeability soils.</p>
3	<p>OPERATING PERMITS</p> <p>Appropriate for areas of greater environmental sensitivity such as wellhead or source water protection zones, shellfish growing waters, bathing or water-contact recreation or other areas where prescriptive designs alone are inadequate for meeting public health / water quality requirements.</p>
4	<p>RME OPERATION AND MAINTENANCE</p> <p>Areas of moderate to high environmental sensitivity where critical resources exist and environmental and/or treatment complexity concerns require reliable and sustainable system O & M.</p>
5	<p>RME OWNERSHIP</p> <p>Areas of greatest environmental sensitivity as described in Management Program 4.</p> <p>Preferred management program for cluster systems serving multiple properties under different ownership.</p>

Table 3-1. Summary of management program elements and possible approaches

Program element	Purpose	Basic activities	Advanced activities
Public education and participation	To maximize public involvement in the need for and implementation of the management program.	Provide public meetings, forums, updates, and education programs.	Provide public advisory groups, review groups, and other involvement opportunities in addition to basic program.
Planning	Consider regional and site conditions and impacts, long-term watershed, and public health protection.	Establish minimum lot sizes, surface/ground water setbacks and/or identify critical areas requiring more protection.	Monitor and model regional pollutant loads of different development scenarios; tailor development patterns and requirements to receiver site environmental conditions and technological capabilities.
Performance requirements	Link treatment standards and relative risk to health and water resource goals.	Prescribe acceptable site characteristics and/or system types allowed.	Require system performance to meet standards that consider water resource values, vulnerabilities, and risks.
Site evaluation	Assess site and relationship to other features.	Characterize landscape position, soils, ground & surface water location, size, and other site conditions.	Assess site and cumulative watershed impacts, ground water mounding potential, long-term specific pollutant trends, and cluster system potential.

Program element	Purpose	Basic activities	Advanced activities
Construction	Ensure installation as designed; record as-built drawings.	Inspect installation prior to covering with soil and enter as-builts into record.	Provide supplemental training, certification & licensing programs; provide more comprehensive inspection of installations; verify & enter as-builts into record.
Operation and maintenance	Ensure systems perform as designed.	Initiate homeowner education/ reminder programs that promote regular O&M (pumping).	Require renewable, revocable operating permits with reporting requirements; verifiable responsibility for proper O&M activities.
Residuals management	Minimize health or environmental risks from residuals handling/dispersal.	Require compliance with federal and state residuals disposal codes.	Conduct analysis and oversight of residuals program; Web-based reporting and inspection of pumping and ultimate disposal facility activities.
Training and certification/licensing	Promote excellence in site evaluation, design, installation, and other service provider areas.	Recommend use of only state licensed/certified service providers.	Provide supplemental training and certification/licensing programs in addition to state programs; offer continuing education opportunities, and monitor performance through inspections.
Inspections and monitoring	Document proper service provider performance, functioning of systems, and environmental impacts.	Inspection prior to covering; inspections prior to property title transfer; complaint response.	Require regional surface and ground water monitoring; Web-based system and operational monitoring; required periodic operational & installation inspections.
Corrective actions and enforcement	Ensure timely return to compliance with applicable codes and performance requirements.	Complaint reporting under nuisance laws, inspection and prompt response procedures; penalties.	Denial and/or revocation of operating permit until compliance measures satisfied; set violation response protocol & legal response actions, including correction and liens against property by RME.

Program elements: options (cont)

Program element	Purpose	Basic activities	Advanced activities
Record keeping, inventory, and reporting	Provide inventory development and maintenance for administrative, O&M, planning and reporting to oversight agencies.	Provide inventory information on all systems; performance reports to health agency as required.	Provide GIS-enabled, comprehensive inventories, including Web-based monitoring and O&M data for use in administration, O&M, compliance achievement and reporting activities.
Financial assistance and funding	Provide financial and legal support for management program.	Implement basic powers, revenue-generation and legal backup for a sustainable program.	Initiate monthly/quarterly service fees; cost-share or other repair/replacement program; full financial and legal support for management program; equitable revenue base and assistance programs; implementation of regular reviews and modifications.

Albemarle Regional Health District

- Originally PPCC Health District now 14 County region in NE North Carolina
- Data-base of all systems in 4 county core and all innovative systems in remaining counties
- Management contract with counties
- Special Legislation passed

NSF Standard 40

- Requires 2 year maintenance contract to certify standard 40
- Retesting and recertification required to maintain product certification

Charlotte County, FL

- NSF Standard 40 Requires 2 year Maintenance Contract
- Charlotte County maintains data base, Requires advanced systems within 100 feet of surface water or on lots 10,000 ft.sq. or less
- Tax support and operating fees

Cranberry Lake, NJ

- 550 properties
- Renewable permits – 3 year frequency/\$15.00 to renew
- Renewal upon demonstration that system is functioning properly

Pena Blanca, NM

- 185 homes and businesses
- Pena Blanca Sanitation District responsible for planning, installation, inspection, operation and maintenance; septage pumping contracted every 2 years
- \$10.64/month fee paid to district

Shannon City, IA

- 36 systems, unanimous vote for retaining onsite systems
- 3 compliant systems/33 non-compliant
- \$3.1 Million to sewer vs. \$0.76 for managed onsite
- \$38.00 month water and sewer bill
- SIRWA Operates through interlocal agreement

Pickney Brothers, TN Onsite Utility Corporation

- 12 onsite utilities throughout state
- Franchised through state utility commission
- Fee regulated by state (approx \$36.00/mo.)
- Collection system and cluster treatment
- Design, install, own, operate, maintain and manage

RME OWNERSHIP

- All residual management through contract
- Pumping frequency determined through inspection
- Site management controlled
- Compliance with rule condition of contract

EPA Onsite and Decentralized Web Site

<http://www.epa.gov/owm/onsite>



Animal Waste Management

- 15 A. NCAC. 0200 Waste Not Discharged to Surface Waters
- Site Requirements
- Operator Requirements – Training and Certification
- Continuing Education
- EMS Emerging and Management Tool

DEVELOPMENT Of EMS TOOLS For AGRIBUSINESS

ROBERT RUBIN, Professor and Extension Specialist,
NCSU - BAE

RON SHEFFIELD, Extension Specialist,
University of Idaho

KARL SHAFER, Extension Specialist, NCSU – SSC

BETH GRAVES and BARB SATLER, NCDPPEA

WHAT IS AN EMS

- PLANNED, ORGANIZED, ROUTINIZED PROCESS TO:
 - IDENTIFY ENVIRONMENTAL, OCCUPATIONAL SAFETY IMPACTS OF AN AGRICULTURAL OR AGRIBUSINESS ORGANIZATION
 - ESTABLISH PERFORMANCE BASED GOALS AND PROCEDURES TO REDUCE ADVERSE IMPACTS
 - MEASURE PERFORMANCE TO ASSURE GOALS ARE MET
 - REPORT RESULTS TO MANAGERS
 - PROVIDE FEEDBACK AND CONTINUAL IMPROVEMENT

WHY AN EMS APPROACH

- WHEN PROPERLY DEVELOPED AND IMPLEMENTED, EMS PROGRAMS EXHIBIT TREMENDOUS POTENTIAL TO
 - IMPROVE LOCAL COMPLIANCE
 - SAVE MONEY AND IMPROVE RETURNS
 - REDUCE LIABILITIES
 - IMPROVE INDIVIDUAL AND ORGANIZATIONAL EFFICIENCY

WHY DEVELOP AN EMS FOR AGRICULTURAL OPERATIONS

- INCREASING CONCERN REGARDING THE IMPACT OF AGRICULTURAL OPERATIONS ON ENVIRONMENTAL QUALITY
- PROACTIVE APPROACH TO ADDRESS CONCERNS BEFORE THEY BECOME ISSUE
- IMPROVES PRODUCTION/YIELD

APPLICATION OF THE PDCA PHILOSOPHY TO ON-FARM PRODUCTION

- P – PLAN
- D – DO
- C – CHECK
- A – ACT
- REVISE ACTIVITIES AS NEEDED TO
ACHIEVE CONTINUAL
IMPROVEMENT

TWO PRIMARY FOCUSES OF EMS IN AGRICULTURE

- IMPROVED ENVIRONMENTAL
COMPLIANCE AND PERFORMANCE
- SOURCE REDUCTION (POLLUTION
PREVENTION)

NC DPPA/CES PORK EMS

- 2 Year Project
- Identified 7 Pilot Farms
- Pilot EMS Development On-Farm
- Tool/Template Development
- Transfer
- Strong Support from DENR

KEY ELEMENTS OF LOCAL EMS

- ENVIROMENTAL
AND
OCCUPATIONAL
POLICY
- COMPREHENSIVE
PLANNING
- IMPLEMENTATION
AND OPERATION
- CHECK
- CORRECTIVE
ACTION
- REVIEW AND
FEEDBACK

POLICY ISSUE

- ESTABLISHES DIRECTION FOR PROGRAM
- SETS STANDARDS FOR PERFORMANCE AT ALL LEVELS OF ORGANIZATION

Recurring Policy Issues

(N = 7)

- Sound Environmental Stewardship
- Promotion of health, safety, and well being of all employees
- Meet or exceed all Environmental, Health and Safety Laws/Rules
- Practice Pollution Prevention, recycling
- Convey to customers, vendors, the public, and industry associates policy commitment
- Strive for continual improvement in all aspects of program

PLANNING ISSUES-IMPACTS

- EVALUATION OF THE ENVIRONMENTAL, OCCUPATIONAL, AND SAFETY ASPECTS OF YOUR ORGANIZATION
 - WATER USE – SRSI/REUSE
 - SOLID WASTE GENERATION/BY-PRODUCT UTILIZATION –FEED/COMPOST
 - AIR QUALITY – DUST
 - LAGOON MANAGEMENT

PLANNING ISSUES (CONT.)

- STORMWATER MANAGEMENT
- SDWA
- EPCRA
- WASTEWATER RESIDUALS
- FEED SYSTEM MANAGEMENT
- STOCK WATERING
SYSTEMS/COOLING SYSTEMS –
POTABLE WATER USE

PLANNING (CONT.)

- BASED ON THE COMPREHENSIVE REVIEW OF FARM PROGRAM AND ASPECTS, DEVELOP MEASUREABLE, PERFORMANCE BASED OBJECTIVES AND TARGETS DESIGNED TO MINIMIZE ADVERSE IMPACTS AND IMPROVE COMPLIANCE
- I.E. IMPROVE MANURE MANAGEMENT PRACTICES THROUGH CNMP AND REDUCTION IN ODOR

Impact Ratings

(N=7)

- Activity
- Aspect
- Impact Assessment Scale
 - Regulation
 - Scale
 - Costs
 - Public Perception
 - Probability
 - Total

Examples of Rankings From Seven Pilot Farms

Activity	Waste Mgt.	Mortality Mgt.
Aspect	Land Application	Catastrophic Loss
Impact	Soil, GW, Air	SW, Odor,
Regulations	5	3
Scale of Impact	5	3
Costs	5	5
Perception	5	3
Probability	2	2
TOTAL	22	16

Activities Identified by 7 On-Farm Participants

- Air Quality/Dust - Odor/particulates
- Waste Management
 - Lagoon Level Monitoring
 - Field Applications/Operations
 - Lagoon/Berm/Bank Maintenance
 - Flushing
 - Testing

Activities Identified (Cont.)

- Vehicle Maintenance
- Mortality Management
 - Normal Losses
 - Abnormal/Catastrophic Losses
 - Afterbirth

Activities Identified (Cont.)

- Automated Feed Systems
- Automated Watering Systems
- Heating and Cooling
 - Fuel/power
 - Heat lamps/LP heaters
 - Misting Systems

IMPLEMENTATION AND OPERATION

- ESTABLISH LOCAL PLANS AND PROCEDURES THROUGH TEAM BUILDING PROCESSES
- UTILIZE TEAMS TO ACHIEVE REQUIRED ASSESSMENT OF GOALS

CHECK

- ASSURE TEAMS ASSESSING GOALS APPROPRIATELY
- ASSURE GOALS ESTABLISHED PROPERLY AND REFLECT ACCURATE ASSESSMENT OF CORPORATE PICTURE

CORRECTIVE ACTION AND REVIEW

- CONTINUOUS REVIEW AT
CORPORATE LEVEL
- CONTINUOUS COMMITMENT TO
IMPROVEMENT AT ALL LEVELS OF
CORPORATION

INDUSTRY REQUESTS

- INCENTIVES?
 - MARKET INCENTIVES?
 - COST SHARE?
 - SWCD?
 - OTHER?
- REGULATORY FLEXIBILITY
- ENFORCEMENT

EXTENSION SERVICES

- OPERATOR TRAINING
- TECHNICAL ASSISTANCE AND EDUCATION
- PUBLIC PARTICIPATION
- ASSISTANCE TO FARMERS IN DEVELOPING EMS/READINESS TO PROCEED
- OTHERS???

CONCLUSIONS

- EMS APPROACH SEEMS HERE TO STAY
- AGRIBUSINESS RECOGNIZES EMS CAN BE USED AS TOOL FOR CONTINUAL IMPROVEMENT
- EXTENSION COMMITTED TO ASSIST WITH EMS APPROACH
- REGULATORY FLEXIBILITY
- INCENTIVES?

Biosolids and Septage Management

- 40 CFR Part 503 (revisited)
- 15 A. NCAC .0200
- Site and Soil Requirements
- Comprehensive Nutrient Management Plan
- Training and Certification
- Continuing Education

Emerging Issues

- CNMP
- Pathogen Standards
- Organic Compounds
- Management Issues
 - Odor
 - Nuisance
 - Insult – involuntary, imposed risk vs. voluntary risk

Biosolids EMS

- Several ongoing – Gastonia
- Opportunity to Succeed
- Public Involvement
- Mutual Expectations Developed

Stormwater Management

- Phase 2
- Training and Education
- Research

NCSU Stormwater Education

- Bill Hunt
- www.bae.ncsu.edu/people/faculty/hunt
 - NCSU Online Courses – Distance Learning
 - Publications
 - Research and Demonstration Projects
 - Training Courses
 - For credit
 - Professional development

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REGULATORS HANGED

After the Regulators
were defeated at Ala-
mance, May 16, 1771,
six of their number
were hanged $\frac{1}{4}$ mile
east, June 19, 1771.

VISITOR INFO
CENTER →